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UNIVERSITY OF BAHRAIN COLLEGE OF INFORMATION TECHNOLOGY  
DEPARTMENT OF COMPUTER SCIENCE SUMMER SEMESTER 2013  
ITCS242: ASSEMBLY PROGRAMMING FIRST TEST DATE: JULY 22, 13  
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QUESTION ONE: Write a complete assembly program that:

[16 pts]

- Defines an array NAF consisting of 36 elements of signed double words.
- Randomly generate 36 double words and store the generated values in array NAF.
- Displays on the screen all double words of array NAF in binary one value per line.
- Swaps the two words in each array element.
- Displays in HEX all elements of array NAF as words separated by a space.

```
INCLUDE Irvine32.inc
.DATA
NAF SDWORD 36 dup(?)

.CODE
MAIN PROC
CALL RANDOMIZE
; Generating random numbers and storing them in array NAF
MOV ESI, OFFSET NAF
MOV ECX, LENGTHOF NAF
L0: CALL RANDOM32
MOV [ESI], eax
ADD ESI, 4
LOOP L0
CALL CRLF
; Display ARRAY NAF as double words in binary ONE VALUE PER LINE
MOV ECX, LENGTHOF NAF
MOV ESI, 0
L2: MOV EAX, NAF[ESI]
CALL WRITEBIN
CALL CRLF
ADD ESI, 4
LOOP L2
CALL CRLF
; Swapping the words in each double word
MOV ESI, 0
MOV ECX, LENGTHOF NAF
L9: MOV AX, WORD PTR NAF[ESI]
XCHG AX, WORD PTR NAF[ESI+2]
MOV WORD PTR NAF[ESI], AX
ADD ESI, 4
LOOP L9
; Display elements of array NAF as words (HEX) separated by space
MOV ESI, OFFSET NAF
MOV EBX, TYPE NAF / 2
MOV ECX, LENGTHOF NAF * 2
CALL DUMPHEX
CALL CRLF

EXIT
MAIN ENDP
END MAIN
```

**QUESTION TWO:**

{12 points}

Choose the BEST correct answer for each of the following questions and **write its letter symbol down in the table shown below**

- 1) The statement that produces syntax error during assembly process is:  
 a) MOV AX, [EBX]                      b) MOVZX EBX, CL                      c) INC AX  
 d) MOV [EBX], [EAX]                      e) MOV DH, 20H
- 2) The instruction that stores 0 in the memory word pointed by esi register is:  
 a) MOV esi, 0                      b) MOV [esi], 0                      c) SUB [esi], [esi]  
 d) SUB esi, esi                      e) None
- 3) The statement that produces syntax error during assembly process is:  
 a) ADD EAX, EBX                      b) SUB EAX, 20H                      c) XCHG AX, BX  
 d) SUB [EBX], AX                      e) None
- 4) If a PC has 24 data lines and 8GB of main memory, the minimum number of address lines is  
 a) 8                      b) 33                      c) 32                      d) 64                      e) None
- 5) The register the must be used to store the loop repetition counter when using LOOP instruction is:  
 a) ECX                      b) EBX                      c) ESI                      d) EIP                      e) None
- 6) The type of the SOURCE operand used in the instruction: MOV BX, sizeof HI; is:  
 a) Immediate                      b) Direct                      c) Indexed                      d) indirect                      e) None
- 7) If the physical address is 40000H and the offset value is 39C0, then the segment value will be:  
 a) 4C64                      b) 4C640                      c) 3C64                      d) 3C640                      e) None
- 8) The instruction that subtracts the contents of CX register from the word pointed by ebx register is:  
 a) SUB CX, [EBX]                      b) SUB ebx, CX                      c) SUB [ebx], CX  
 d) SUB WORD PTR EBX, CX                      e) None
- 9) The 8-bit value 10001010 represents unsigned decimal value \_\_\_\_ and signed decimal value \_\_\_\_  
 a) -138, 118                      b) 138, -118                      c) 138, -138                      d) 118, -118                      e) None
- 10) The directive that defines an array OUR consisting 0f 24 signed bytes all initialized with -50 is:  
 a) OUR sbyte 24 dup(-50)                      b) OUR sdword 24 dup(-50)  
 c) OUR sword 24 dup(0A0H)                      d) OUR sbyte 24 dup("-50")                      e) None
- 11) The step in the instruction cycle that determines where to store the result is:  
 a) STORE RESULT                      b) INSTRUCTION DECODE                      c) NEXT INSTRUCTION  
 d) OPERANDS FETCH                      e) None
- 12) The statement that produces syntax error during assembly process is:  
 a) INC AX                      b) MOVZX EBX, CL                      c) ADD AX, BX  
 d) MOV SX EBX, EAX                      e) MOV DH, 20H

Question #	1	2	3	4	5	6	7	8	9	10	11	12
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Answer	D	E	E	B	A	A	C	C	B	A	B	D
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**QUESTION THREE:**

{15 points}

- (a) Given: U    sword    7F2C0987H, 5A3B4EH, ...; Write **NO more than 4 instructions** to display all values in U in hexadecimal as bytes separated by ONE space.

```
MOV     ECX, SIZEOF U
MOV     EBX, TYPE U /4
LEA     ESI, U
CALL    DUMPMEM
```

- (b) Given: U    sword    44 dup(?); Write **NO more than 5 instructions** to fill the 2 bytes in each word of array U with -4 and +4.

```
MOV     ECX, LENGTHOF U
MOV     EBX, 0
L2: MOV     U[EBX], 0FC04H
ADD     EBX, 2
LOOP    L2
```

Given the following data definitions:

```
U    sword    20 dup ( ? )
U    sword    64 dup (3A7CH)
```

- (c) Write **NO more than 7 instructions** to move ALL words of U up in the memory for 40 bytes. (Not allowed to change the values in U).

```
MOV     ECX, LENGTHOF U
MOV     EBX, 0
L6: MOV     AX, U[EBX]
MOV     U[EBX-40], AX
ADD     EBX, 2
LOOP    L6
```

**QUESTION FOUR:**

[10 pts]

- (a) Assume UU is a predefined signed memory word, Give NO more than **3 instructions** to perform the following:  $EBX = AX - UU * 2$

```
SUB     AX, UU
SUB     AX, UU
MOVSX   EBX, AX
```

- (b) Given: FOO QWORD ?; Give NO more than **3 instructions** to swap the 2 dwords in FOO.

```
MOV     ECX, DWORD PTR FOO
XCHG    ECX, DWORD PTR FOO+4
MOV     DWORD PTR FOO, ECX
```

- (c) Carefully study the following data definitions and instructions then choose the BEST correct answer for each of the following 4 questions.

```
T1  BYTE    11H, 22H, 7FH, 9AH, 2 dup(?)
T2  WORD     ?, 6F7FH, 6ACAH, 814AH, 69CFH, 12A8H
UT  DWORD    5A3C7F98H, 56F14BH, 69CB3A2CH, 248F7C39H
RT  EQU      $-T1

MOV     BX, WORD PTR T1
MOV     AX, WORD PTR UT+2
MOV     DX, WORD PTR UT-6
MOV     CH, SIZEOF T2
MOV     CL, LENGTHOF UT
```

After executing the above instructions,

- 5) The register DX will contain:  
a) 4ACAH                      b) CA4AH                      c) **814AH**                      d) 4A81H                      e) None
- 6) The register CX will contain:  
a) 0405H                      b) 0C05H                      c) Unknown                      d) 040AH                      e) **None**
- 7) The value assigned to the constant name RT is:  
a) 16                          b) 20H                          c) 34H                          d) **34**                          e) None
- 8) The register AX will contain:  
a) **5A3CH**                      b) 5A3EH                      c) 7F9AH                      d) F14BH                      e) None